Acromag®

IntelliPack Series 841T Transmitter and Combination Transmitter/Alarm Frequency or Pulse Counting Input

USER'S MANUAL

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Safety Summary - Symbols on equipment:

Means "Caution, refer to this manual for additional information".

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IMPORTANT SAFETY CONSIDERATIONS

It is very important for the user to consider the possible adverse effects of power, wiring, component, sensor, or software failures in designing any type of control or monitoring system. This is especially important where economic property loss or human life is involved. It is important that the user employ satisfactory overall system design. It is agreed between the Buyer and Acromag, that this is the Buyer's responsibility.

1.0 INTRODUCTION

These instructions cover hardware functionality of the transmitter models listed in Table 1. Supplementary sheets are attached for units with special options or features.

Table 1: Models Covered in This Manual

Series/ Input/Type	-Options/Output/ Enclosure/Approvals[1]	-Factory Configuration[2]
841T	-0500[3]	-C
841T	-1500[3]	-C

Notes (Table 1):
1. Agency approvals include CE, UL Listed, and cUL Listed.
2. Include "-C" suffix to specify the factory configuration option. Otherwise, no suffix is required for standard configuration.
3. Model 841T-0500 units have transmitter functionality only, while 841T-1500 transmitters include an alarm relay.

Module programming, transmitter operation, and the IntelliPack Configuration Software is covered in the IntelliPack Transmitter Configuration Manual (8500-570).

DESCRIPTION

Series 841T transmitters and combination transmitter/alarms are members of the popular Acromag IntelliPack transmitter & alarm family. The 841T will condition periodic or pulse waveform signals, and provide an isolated process current or voltage output, plus an optional alarm relay (Model 841T-1500). The unit will accept unipolar or bipolar frequency input signals from 0Hz to 50KHz, or function as an event counter with a range from 0 to 65535 pulses. The output is an isolated process current or voltage, plus an optional Single-Pole Double-Throw (SPDT) electro-mechanical alarm relay (841T-1500 only). All IntelliPacks contain an advanced technology microcontroller with integrated downloadable flash memory and EEPROM for non-volatile program, configuration, calibration, and parameter data storage. Units are fully reconfigurable via our user-friendly Windows 95® or NT® IntelliPack Configuration Program. Field reconfigurability is also possible with module push-buttons and status LED's. Once configured, these modules may operate independent of the host computer for true embedded monitoring and control.

Modules may be field connected for bipolar or unipolar, periodic or pulse waveforms. Programmable pullup or pulldown resistors, plus +8.2V/+12V excitation supplies, are available at the input to interface with a variety of input sensor or transducer types. The optional SPDT alarm relay (Model 841T-1500) has a yellow LED on the front of the module that provides a visual indication of the high or low alarm condition. Additionally, "Run", "Status", and "Zero/Full-Scale" LED's provide local feedback of operating mode, system diagnostics, and field configuration status. Front panel push buttons are used to facilitate field reconfiguration, or to reset a latched alarm, without having to connect a host computer.

The module uses a comparator and logic gate to convert an input signal into a digital TTL pulse stream. A microcontroller samples the pulse stream and measures its frequency or counts the number of pulses. An external counter reset terminal is also included. The module completes the user specified input to output transfer equation and controls an optically isolated Digital-to-Analog Converter (DAC) to produce a corresponding process current or voltage output signal. The microcontroller also drives a separate alarm circuit to control the relay contacts.

Flexible transmitter functionality and an optional limit alarm combined in a single device, plus convenient reprogrammability, makes this instrument extremely powerful and useful over a broad range of applications. Input averaging may be used with frequency inputs to smooth input frequency jitter. Debounce may be used with pulse counting inputs to eliminate counting false pulses due to electromechanical relay contact bounce and other mechanical effects. The analog output may produce a normal (ascending), or reverse (descending) response.

The relay of 841T-1500 models may be configured as a limit alarm with deadband, with latching or non-latching contacts, and for failsafe or non-failsafe modes. A programmed relay time delay may be implemented to filter transients and minimize nuisance alarms.

All IntelliPack modules are designed to withstand harsh industrial environments. They feature RFI, EMI, ESD, EFT, and surge protection, plus low temperature drift, wide ambient temperature operation, and isolation between input, power, output, and relay contacts. They also have low radiated emissions per Conformity European (CE) requirements. As a wide-range DC-powered device, the unit may be powered from DC power networks incorporating battery back-up. Additionally, the input power terminal is diode-coupled, providing reverse polarity protection. This allows the unit to be connected to redundant power supplies, or several units to safely share a single DC supply.

Units are DIN-rail mounted and removable terminal blocks facilitate ease of installation and replacement, without having to remove wiring. Transmitter power, output, and relay wiring are inserted at one side of the unit, while input wiring is inserted at the other side. Connectors are an industry standard screw clamp type and accept a wide range of wire sizes.

The safe, compact, rugged, reconfigurable, and reliable design of this transmitter makes it an ideal choice for control room and field applications. Custom IntelliPack module configurations are also possible (please consult the factory).

Key IntelliPack 841T Features

- **Agency Approvals** - CE, UL Listed, & cUL Listed.
- **Easy Windows® Configuration** - Fully configurable via our user friendly Windows 95® or NT® Configuration Program.
- **Nonvolatile Reprogrammable Memory** - Module uses an advanced technology microcontroller with integrated, non-volatile, downloadable flash memory. This allows the functionality of this device to be reprogrammed many times.
- **Convenient Field Reprogrammability** - Adjustment to transmitter zero and full scale, plus alarm setpoint and deadband can be made via module push-buttons and LED's, thus facilitating in-field changes without having to connect a host computer (frequency inputs only).

Key IntelliPack 841T Features

- **Fully Isolated** - The input, power, and output circuits, and optional relay contacts are all isolated from each other for safety and increased noise immunity.
- **Wideband Frequency Input** - This model accepts frequency inputs from 0Hz to 50KHz. Inputs below 1Hz are represented as 0Hz.
- **Flexible Pulse Counter Function** - The built-in event counter function counts pulses on the positive or negative edge, upward, in the range 0-65535, and includes an external counter reset. The counter may wrap around from 65535, latch at a programmed count value, or automatically reset itself to 0 after reaching a programmed count value. The counter may also be reset remotely via the PC or via a counter reset control signal wired to the unit.
- **Input Filtering** - Inputs include hysteresis. Other filtering modes include averaging (frequency inputs), debounce (event counter), relay time delay (alarms), and deadband (alarms). This helps to reduce the negative effects of measurement jitter, false counts, electro-mechanical relay contact bounce, plus other mechanical effects.
- **Universal Analog Outputs** - Supports current output ranges of 0-20mA, 4-20mA, & 0-1mA, and 0-5V or 0-10V outputs. Current outputs will drive up to 550Ω, typical.
- **Flexible Interface Supports Many Input Types** - The programmable pull-up/down resistors & selectable excitation provides support for a variety of input types including TTL, dry contact, low or high side transistor switches, magnetic pickups, proximity sensors, and open drain or collector switches.
- **Supports Bipolar or Unipolar Input Signals** - Interfaces with both zero crossing and non-zero crossing signals. Voltage threshold and relative hysteresis are user selectable.
- **Convenient Input Excitation** - Input includes +8.2V & +12V excitation supplies for powering sensors & transducers (up to 24mA).
- **Normal Or Reverse Acting Output** - The output of this transmitter may be software configured for a normal acting (ascending), or reverse acting (descending) response.
- **Self-Diagnostics** - Built-in routines operate upon power-up for reliable service, easy maintenance, and troubleshooting.
- **Wide-Range DC-Powered** - This device receives power over a wide DC supply range and the power terminal is diode-coupled. This makes the product useful for systems with redundant supplies and/or battery back-up.
- **Wide Ambient Operation** - The unit is designed for reliable operation over a wide ambient temperature range.
- **Hardened For Harsh Environments** - The unit will operate reliably in harsh industrial environments and includes protection from RFI, EMI, ESD, EFT, and surges, plus low radiated emissions per CE requirements.
- **Convenient Mounting, Removal, & Replacement** - The DIN-rail mount and plug-in type terminal blocks make module removal and replacement easy.
- **High-Resolution Precise D/A Conversion** - Transmitter output is driven with a high-resolution, low noise, Sigma-Delta, Digital-to-Analog Converter (Σ-Δ DAC) for high accuracy and reliability.
- **LED Indicators** - Used to indicate operating, alarm, system diagnostic, and field configuration status.

Alarm Relay Model Only (841T-1500)

- **Powerful Alarm Functionality** - May be programmed for limit alarms with deadband (frequency inputs only), latching/ non-latching contacts, and failsafe/non-failsafe operation. An event counter may be configured with a high alarm.
- **High-Power SPDT Relay Contacts -** Includes a Single-Pole-Double-Throw (SPDT) electro-mechanical alarm relay for switching up to 230VAC & 5A.
- **Failsafe or Non-Failsafe Relay Operation** - May be configured for failsafe or non-failsafe relay operation.
- **Configurable Setpoint With Deadband** - Includes programmable deadband (frequency inputs only) to help eliminate relay "chatter" and prolong contact life.
- **Configurable Latching or Momentary Alarms** - May be configured for automatic alarm reset, or a latching alarm with manual push-button or software reset.
- **Configurable Relay Time Delay Filters Transients** - Useful for increased noise immunity and to filter transients.

ACCESSORY ITEMS

The following IntelliPack accessories are available from Acromag. Acromag also offers other standard and custom transmitter and alarm types to serve a wide range of applications (please consult the factory).

IntelliPack Configuration Software (Model 5030-881)

IntelliPack alarms and transmitters are configured with this user-friendly Windows 95® or NT® Configuration Program. This software package includes the IntelliPack Alarm Configuration Manual (8500-563) and IntelliPack Transmitter Configuration Manual (8500-570). These manuals describe software operation and various alarm and transmitter functions in detail. All transmitter and alarm functions are programmable and downloadable to the module via this software. Non-volatile memory within the IntelliPack provides program, configuration, and data storage.

IntelliPack Serial Port Adapter (Model 5030-913)

This adapter serves as an isolated interface converter between the EIA232 serial port of the host computer and the Serial Peripheral Interface (SPI) port of the IntelliPack module. It is used in conjunction with the Acromag IntelliPack Configuration Software to program and configure the modules. This adapter requires no user adjustment, no external power, and operates transparent to the user. It receives its input power from the IntelliPack module. The adapter has a DB9S connector that mates to the common DB9P serial port connector of a host computer. The adapter also has a 6-wire RJ11 phone jack to connect to the IntelliPack alarm module via a separate interconnecting cable (described below). Refer to Drawing 4501-635 for computer to IntelliPack connection details.

IntelliPack Cable (Model 5030-902)

This 6-wire cable is used to connect the SPI port of the IntelliPack Serial Port Adapter to the IntelliPack. This cable carries the SPI data and clock signals, reset signal, and +5V power and ground signals. The cable is 7 feet long and has a 6-wire RJ11 plug at both ends which snap into jacks on the Serial Port Adapter and IntelliPack module.

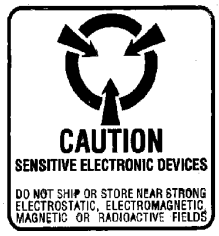
IntelliPack Software Interface Package (Model 800C-SIP)

The IntelliPack Software Interface Package combines the Configuration Software (5030-881), Alarm Configuration Manual (8500-563), Transmitter Configuration Manual (8500-570), Serial Port Adapter (5030-913), and Cable (5030-902), into a complete kit for interfacing with IntelliPack Alarms and Transmitters.

2.0 PREPARATION FOR USE

UNPACKING AND INSPECTION

Upon receipt of this product, inspect the shipping carton for evidence of mishandling during transit. If the shipping carton is badly damaged or water stained, request that the carrier's agent be present when the carton is opened.



If the carrier's agent is absent when the carton is opened and the contents of the carton are damaged, keep the carton and packing material for the agent's inspection. For repairs to a product damaged in shipment, refer to the Acromag Service Policy to obtain return instructions. It is suggested that salvageable shipping cartons and packing material be saved for future use in the event the product must be shipped.

This module is physically protected with packing material and electrically protected with an anti-static bag during shipment. However, it is recommended that the module be visually inspected for evidence of mishandling prior to applying power.

This circuit utilizes static sensitive components and should only be handled at a static-safe workstation.

INSTALLATION

The transmitter module is packaged in a general purpose plastic enclosure. Use an auxiliary enclosure to protect the unit in unfavorable environments or vulnerable locations, or to maintain conformance to applicable safety standards. Stay within the specified operating temperature range. As shipped from the factory, the unit is factory calibrated for all valid input ranges and has the default configuration shown in Table 2 below:

WARNING: Applicable IEC Safety Standards may require that this device be mounted within an approved metal enclosure or sub-system, particularly for applications with voltages greater than or equal to 75VDC or 50VAC.

Table 2: 841T Default Factory Configuration

PARAMETER	CONFIGURATION/CALIBRATION
Input Range	Frequency 0 to 50KHz
Samples	1 (No Input Averaging)
Resistor	Pull-Up
Threshold	Bipolar 0.0V (zero crossing) with +/-25mV Hysteresis
Event Debounce	5ms
Event Edge	Rising
Counter Termination	Auto-Reset
Output Range	0 to 10VDC (Jumper Installed)
Output Mode	Normal Acting (Ascending Signal)
Excitation Supply	8.2V (Use of excitation is optional)
Relay Mode & Setpoint	High Limit at 50KHz
Deadband	500Hz
Reset Type	Automatic Reset (Non-Latching)
Operating Mode	Failsafe
Relay Time Delay	100ms

Shaded entries apply to Model 841T-1500 units which also include alarm functionality.

Your application may differ from the default configuration and will require that the transmitter be reconfigured to suit your needs. This is accomplished with Acromag's user-friendly Windows 95®/NT® Configuration Program and Serial Port Adapter. Configuration is normally done prior to field installation since field configurability via the module's push-buttons is generally limited to zero, full-scale, setpoint, and dropout adjustments (frequency inputs only). See the Transmitter Configuration Manual (8500-570) for instructions.

Jumper Installation (For Voltage Output Only)

For voltage output, a short jumper must be installed between the output "I+" and "JMP" terminals. A jumper wire is included with the unit and is already installed between the output "JMP" and "I+" terminals. Verify the position of this jumper if your application requires output voltage. Remove this jumper for current output applications. Refer to the Electrical Connections Drawing 4501-683.

Mounting: Refer to Enclosure Dimensions Drawing 4501-642 for mounting and clearance dimensions.

DIN Rail Mounting: This module can be mounted on "T" type DIN rails. Use suitable fastening hardware to secure the DIN rail to the mounting surface. Units may be mounted side-by-side on 1-inch centers for limited space applications.

"T" Rail (35mm), Type EN50022: To attach a module to this style of DIN rail, angle the top of the unit towards the rail and locate the top groove of the adapter over the upper lip of the rail. Firmly push the unit towards the rail until it snaps solidly into place. To remove a module, first separate the input terminal block(s) from the bottom side of the module to create a clearance to the DIN mounting area. Next, insert a screwdriver into the lower arm of the DIN rail connector and use it as a lever to force the connector down until the unit disengages from the rail.

Electrical Connections

Terminals can accommodate wire from 12-24 AWG (stranded or solid copper). Strip back wire insulation 1/4-inch on each lead before installing into the terminal block. Input wiring should be shielded twisted-pair. Since common mode voltages can exist on signal wiring, adequate wire insulation should be used and proper wiring practices followed. It is recommended that transmitter output and power wiring be separated from the input signal wiring for safety, as well as for low noise pickup. Note that input, power, output, and relay terminal blocks are a plug-in type and can be easily removed to facilitate module removal or replacement without removing individual wires. If your application requires voltage output, you must install a jumper between the output "I+" and "JMP" terminals (jumper is installed at the factory). Remove this jumper for current output applications. Be sure to remove power and/or disable the load before unplugging the terminals to uninstall the module, installing or removing jumpers, or before attempting service. All connections must be made with power removed.

CAUTION: Risk of Electric Shock - More than one disconnect switch may be required to de-energize the equipment before servicing.

1. **Power:** Refer to Electrical Connections Drawing 4501-683. Variation in power supply voltage within rated limits has negligible effect on module accuracy. For supply connections, use No. 14 AWG wires rated for at least 75°C. The power terminal is diode-coupled for reverse polarity protection.

2. **Frequency or Pulse Counting Inputs:** Connect input(s) per Drawing 4501-683. Observe proper polarity (see label for input type). Excitation is provided at the input terminals. For TTL or low-side transistor switches, use the on board pullup resistor. For high-side transistor switches (open drain or collector), use the on board pull-down resistor. For dry contact switches, use the on-board excitation supply and pull-up or pull-down resistors, as required.

   WARNING: If input frequency exceeds the full-scale beyond 110%, sample aliasing could cause measurement error and generate false alarms. Limit the maximum frequency to less than 110% of full-scale to avoid these errors.

3. **Analog Output Connections**: Wire outputs as shown in Electrical Connections Drawing 4501-683. For voltage output, you must also install a jumper between the output "I+" and "JMP" terminals. Remove this jumper for current output.

   Note: For sensitive applications, high frequency noise may be reduced by placing a 0.1uF capacitor directly across the load.

4. **Output Relay Contacts (841T-1500 Only)**: Wire relay contacts as shown in Electrical Connections Drawing 4501-683. See the "Alarm Relay Specifications" for power capacity. If necessary, an interposing relay can be used to switch higher currents as illustrated in Interposing Relay Connection Drawing 4501-646.

Electromechanical Relay Contact Protection: To maximize relay life with inductive loads, external protection is required. For DC inductive loads, place a diode across the load (1N4006 or equivalent) with cathode to (+) and anode to (-). For AC inductive loads, place a Metal Oxide Varistor (MOV) across the load. See Relay Contact Protection Drawing 4501-646 for details.

IMPORTANT (Frequency Inputs only): Noise and/or jitter on the input signal has the effect of reducing (narrowing) the instrument's deadband and may produce contact chatter. The long term effect of this will reduce the life of mechanical relays. To reduce this undesired effect, you should increase the effective deadband. Note the input averaging function of this transmitter may also be used to reduce contact chatter.

5. **Grounding:** See Electrical Connections Drawing 4501-683. The module housing is plastic and does not require an earth ground connection. However, there are mounting positions on the output terminals to connect a cable shield, plus earth ground. These connections are isolated from the internal circuit and are recommended to minimize noise and help protect the unit from damaging I/O transients.

WARNING: For compliance to applicable safety and performance standards, the use of shielded cable is recommended as shown in Drawing 4501-683. Further, the application of earth ground must be in place as shown in Drawing 4501-683. Failure to adhere to sound wiring and grounding practices may compromise safety & performance.

3.0 MODULE CONFIGURATION

The IntelliPack module needs to be configured for your application. Configuration is done using Acromag's Windows 95® or NT® IntelliPack Configuration Program and Serial Port Adapter. Transmitter calibration and configuration details are included in the IntelliPack Transmitter Configuration Manual (8500-570). Field calibration is only applicable to frequency input types. Field adjustment of transmitter zero & full-scale (scaling parameters), plus alarm setpoint & dropout (Model 841T-1500), can be accomplished via the module's push-buttons and LED's in the absence of a host computer.

FIELD CONFIGURATION (Frequency Inputs Only)

This program mode allows adjustment to key transmitter calibration and alarm parameters in the field, without having to connect a host computer. Field reprogrammability of zero & full-scale, plus alarm setpoint & deadband ("-1500" units) is accomplished via the transmitter/alarm module's "SET", "MODE", "UP", and "DOWN" push buttons, and the zero/full-scale and relay LED's (see Dwg. 4501-642).

Equipment Required

- An accurate frequency input source adjustable over the configured input range. This source must be accurate beyond the module specifications for best results. Use a source with an output impedance of 100Ω or less. An accurate current or voltage meter is required to monitor the output level. This meter must be accurate beyond the module specifications for best results.

Note: The module's input frequency range must already be set via the IntelliPack Configuration Software. Frequencies outside of the configured input range will not be accepted for zero, full-scale, setpoint, or dropout calibration. Since input frequencies cannot be validated during field programming, entering incorrect signals can produce an undesired output response. Install a jumper between the output "I+" and "JMP" terminals for voltage output (default), remove this jumper for current output.

Transmitter/Alarm General Field Programming Procedure

The following procedure uses the corresponding zero/full-scale (labeled "Z/FS") and relay (labeled "RLY") LED's to indicate which parameter is being programmed. A constant ON zero/full-scale LED refers to zero configuration (input for 0% output), a flashing ON/OFF zero/full-scale LED refers to full-scale/span configuration (input for 100% output). A constant ON relay LED indicates setpoint adjustment, a flashing ON/OFF relay LED indicates dropout/deadband adjustment. Refer to Table 3.

CAUTION: Do not insert sharp or oversized objects into the switch openings as this may damage the unit. When depressing the push-buttons, use a blunt tipped object and apply pressure gradually until you feel or hear the tactile response.

1. Connect a frequency source to the input, as required (refer to Electrical Connections Drawing 4501-683).
2. Apply power, and the module's green "Run" LED will light.
3. Press and hold the **"MODE"** push button until the green "Run" LED turns OFF and the yellow "Zero/Full-Scale" LED turns ON. In this mode, the unit is ready to accept a zero input for the transmitter (scaling input for 0% output). If you do not wish to change the zero parameter, skip to step 7.
4. Adjust the input source near the zero level according to your input range (value must be within input range selected). For best results, use a frequency of 1Hz or greater. Unmeasurable frequencies below 1Hz are interpreted as 0Hz.
5. Press the **"UP"** or **"DOWN"** push-button one time to cause the module to auto-adjust its output level to the corresponding output zero according to the output range selected. If the output is not exactly at the zero level, then each successive depression of the "UP" or "DOWN" switch will increment or decrement the output signal by a small amount. Holding the switch depressed will increase the amount of increment or decrement.
6. Press the **"SET"** push-button to accept the zero value. Note every time "SET" is pressed, the yellow "Status" LED will flash once and the zero output will be captured.
7. Press the **"MODE"** push button one time. The yellow "Zero/Full-Scale" LED will flash on/off, indicating the unit is ready to accept the full-scale value for setting the span (scaling input for 100% output). If you do not wish to change the full-scale parameter, skip to step 11.
8. Adjust the input frequency to the full-scale level according to your input range (the value must be within the input range selected). The module uses the zero and full-scale levels to set the span (span = full-scale - zero).

Transmitter/Alarm Field Programming Procedure…continued

9. Press the **"UP"** or **"DOWN"** push-button one time to cause the module to auto-adjust its output level to the corresponding full-scale output for the output range selected. If the output is not exactly at the full-scale level, then each successive depression of the "UP" or "DOWN" switch will increment or decrement the output signal by a small amount. Holding the switch depressed will increase the amount of increment or decrement.
10. Press the **"SET"** push-button to accept the full-scale value. Note every time "SET" is pressed, the yellow "Status" LED will flash once and the full-scale output will be captured.
11. If configuring an 841T-0500 model which has no alarm function, skip steps 12-17 and jump ahead to step 18.
12. Press the **"MODE"** push button one time until the yellow zero/full-scale LED goes out and the yellow relay LED turns ON (see Table 4). In this mode, the unit is ready to accept an input setpoint level for the alarm. If you do not wish to change the setpoint, skip to step 15.
13. Adjust input source to the High or Low alarm setpoint level.
14. Press the **"SET"** push button to accept the setpoint. Note every time "SET" button is pressed, the yellow status LED will flash once and the value at the input will be captured.
15. Press the **"MODE"** push button one time and the yellow relay LED should start flashing (see Table 4). This means the unit is ready to accept the dropout level for the alarm. If you do not wish to change the dropout, skip to step 18.
16. Adjust the input frequency to the desired dropout level.
17. Press the **"SET"** push button to accept the input dropout level. Note every time "SET" is pressed, the yellow status LED will flash once and the value at the input will be captured. The module will use the difference between the setpoint and dropout values to calculate relative deadband.
18. Press the **"MODE"** push button one time to complete the program sequence and return to run mode. The green "RUN" LED will turn ON, the yellow "Zero/Full-Scale" LED will be OFF, and the yellow alarm LED will be ON or OFF according to the alarm status. The module will now assume a transfer function based on the zero and full-scale values just set. The setpoint and dropout of 841T-1500 units is used to determine the alarm deadband. Note that until "SET" is pressed, pushing "MODE" will only toggle between the zero & full-scale, plus setpoint & dropout adjustment modes (841T-1500 units), without affecting their values. Further, if no push-buttons are depressed for a period greater than 2 minutes, then the module will automatically revert to run mode (green "Run" LED will light) and no changes will be made to the original zero, full-scale, and optional setpoint & dropout settings.

Notes (Field Program Procedure):

1. In field configuration mode, the yellow zero/full-scale LED (Z/FS) and relay LED (RLY) are used to indicate which program parameter is being adjusted as illustrated in Table 3:

Table 3: Field Configuration LED Program Indication

LED INDICATOR	Constant ON	FLASHING
Yellow Zero/Full-Scale (labeled "Z/FS")	Zero	Full-Scale
841T-1500 Only Yellow Relay (labeled "RLY"),	High or Low Setpoint	High or Low Dropout

Notes (Field Program Procedure)…continued:

2. To summarize, the green "Run" LED is turned off in field configuration mode. The yellow zero/full-scale LED is ON or FLASHING when the corresponding zero or full-scale value is being set in field configuration mode and turned OFF in run mode. The yellow alarm LED is ON or FLASHING when the corresponding setpoint or dropout/deadband level is being set in field configuration mode.
3. If the transmitter/alarm is in field configuration mode and no push buttons are pressed after 2 minutes, then the module will return to the run mode, the green "Run" LED will light, and no changes to any program parameters will be made.
4. Latching alarms require a push button reset to exit the alarm state (this may also be accomplished under software control). Use the up or down push-button on the front of the module to reset a latched alarm relay.

4.0 THEORY OF OPERATION

Refer to the Block Diagram of Drawing 4501-682 and 4501-692 to gain a better understanding of the circuit. Note that these transmitters use a comparator and logic gate to convert the input signal into a digital pulse stream. The comparator is used to provide the threshold and hysteresis, while the logic gate is used to "square" the waveshape. The microcontroller samples the input pulse stream while tracking the number of internal sampling clock cycles to determine the period of the input signal and derive its frequency. The sampling clock rate is 666666.667 cycles per second, or 1.5us per cycle. For frequencies below 100Hz, the number of sampling clock cycles in one input wave cycle is used to determine the period of the input. For frequencies in the range of 100Hz to 1000Hz, the number of sampling clock cycles in eight input wave cycles is used to determine the input period. As such, internal resolution decreases with increasing frequency and is generally better than the display resolution for the range, except near the upper end of the 100Hz and 1000Hz ranges, where it approaches half the display resolution for these ranges. For the 50KHz range, the number of input wave cycles in a gated 1 second period is used to calculate the input period. The microcontroller will compute the input frequency and complete the transfer equation according to the transmitter type and its embedded function. It sends a corresponding output signal to an optically isolated Digital-to-Analog Converter (DAC). The DAC then updates its current or voltage outputs in response. The microcontroller also compares the signal value to the limit value and completes all necessary alarm functions per its embedded program (841T-1500 units only). The embedded configuration and calibration parameters are stored in non-volatile memory integrated within the microcontroller. Only the functions required by an application are actually stored in memory—new functionality can be downloaded via the IntelliPack Configuration Program and Serial Port Adapter. A wide input switching regulator (isolated flyback mode) provides isolated +5V and +16V power to the circuit, plus an isolated +15V output circuit supply.

5.0 SERVICE AND REPAIR

CAUTION: Risk of Electric Shock - More than one disconnect switch may be required to de-energize the equipment before servicing.

SERVICE AND REPAIR ASSISTANCE

This module contains solid-state components and requires no maintenance, except for periodic cleaning and transmitter configuration parameter (zero, full-scale, setpoint, deadband, etc) verification. Since Surface Mounted Technology (SMT) boards are generally difficult to repair, it is highly recommended that a non-functioning module be returned to Acromag for repair. The board can be damaged unless special SMT repair and service tools are used. Further, Acromag has automated test equipment that thoroughly checks and calibrates the performance of each module. Please refer to Acromag's Service Policy Bulletin or contact Acromag for information on service parts and repair.

PRELIMINARY SERVICE PROCEDURE

Before beginning repair, be sure that all installation and configuration procedures have been followed. The unit routinely performs internal diagnostics following power-up or reset. During this period, all LED's will turn ON momentarily, and the green "Run" LED flashes. If the diagnostics complete successfully, the "Run" LED will stop flashing after approximately one second and remain ON. This indicates that the unit is operating normally. If the "Run" LED continues to flash, then this is indicative of a problem. In this case, use the Acromag IntelliPack Configuration Software to reconfigure the module or download its firmware and this will usually cure the problem. If the diagnostics continue to indicate a problem (a continuously flashing green LED), or if other evidence points to a problem with the unit, an effective and convenient fault diagnosis method is to exchange the questionable module with a known good unit.

The IntelliPack Serial Port Adapter also contains a red LED visible at the small opening in the enclosure to the right of the RJ11 receptacle. If this LED is OFF or Flashing and power is ON, then a communication interface problem exists. Note that the adapter receives its power from the IntelliPack module. A constant ON LED indicates a properly working and powered serial interface adapter.

Acromag's Application Engineers can provide further technical assistance if required. When needed, complete repair services are available from Acromag.

6.0 SPECIFICATIONS

841T-1500-C, Frequency/Pulse Input, I/V Output, SPDT Relay
841T-0500-C, Frequency/Pulse Input, I/V Output

General: The IntelliPack Model 841T-0500 is a DC-powered transmitter which conditions a single frequency or pulse count input, and provides an isolated voltage or current output. Isolation is supplied between the sensor input, the output, and power. The 841T-1500 adds a SPDT, Form C, electro-mechanical relay, which provides a local limit alarm function with isolated relay contacts. This transmitter/alarm is DIN-rail mounted.

The unit is configured and calibrated with our user-friendly Windows 95® or NT® IntelliPack Configuration Program. Push-buttons on the module allow adjustment to the zero and full-scale points for the transmitter, plus setpoint and deadband adjustment for modules with the alarm option. All calibration and configuration information is stored in non-volatile reprogrammable memory in the module.

MODEL NUMBER DEFINITION

Transmitters are color coded with a white label. The prefix "8" denotes the IntelliPack Series 800, while the "T" suffix specifies that this device is primarily a process transmitter.

841T: Transmits and isolates a single frequency or pulse counting input.

-X500: The four digits of this model suffix represent the following options, respectively:

X = 1 with Alarm Relay, X = 0 without Alarm Relay;
5 = Output: Transmitter Voltage or Current;
0 = Enclosure: DIN rail mount;
0 = Approvals: Pending (please consult the factory).

INPUT SPECIFICATIONS

Unit must be wired and configured for the intended input type and range (see Installation Section for details). The following paragraphs summarize this model's input types, ranges, and applicable specifications.

Frequency Input: Select 0 to 100.00Hz, 0 to 1000.0Hz, or 0 to 50KHz. Unit accepts unipolar or bipolar (zero crossing) input signals. Frequency is accurately measured to a minimum of 1Hz (50KHz range), or 0.5Hz (100Hz & 1KHz ranges). Unmeasurable input frequencies below 1Hz are represented as 0Hz. Status LED will flash if input frequency is unmeasurable (below 1Hz), or if the signal amplitude is insufficient for detection.

Pulse Counter Input: 100Hz maximum counting rate. Minimum pulse width is 5ms (5ms ON and 5ms OFF for 10ms period or 100Hz). Pulse count range is 0 to 65535 pulses. Unit accepts unipolar or bipolar input pulses and samples the input at a 1.2ms rate.

Unipolar Signal Configuration:

Input Amplitude: 0 to 3V minimum range, 0 to 100VDC maximum range.

Input Threshold: Configurable for 1.5V or 5V, typical.

Input Hysteresis: Configurable for ±25mV (at 1.5V threshold), or ±83mV (at 5.0V threshold), typical.

Bipolar Signal Configuration:

Input Amplitude (0-20KHz): ±50mV minimum (with ±25mV hysteresis) or ±150mV minimum (with ±83mV hysteresis), to ±100V peak-to-peak maximum.

Input Amplitude (Above 20KHz): ±100mV minimum (with ±25mV hysteresis) or ±200mV minimum (with ±83mV hysteresis), to ±100V peak-to-peak maximum.

Input Threshold: 0mV nominal, 0.01V typical with ±25mV hysteresis; 0.03V typical with ±83mV hysteresis.

Input Hysteresis: Configurable for ±25mV or ±83mV, typical.

Minimum Input Pulse Width: Frequency inputs: 10us Pulse counting inputs: 5ms.

Input Overvoltage Protection: Bipolar Transient Voltage Suppressers (TVS).

Resolution: The sampling mechanism used for the 100Hz and 1000Hz ranges results in decreased internal resolution with increased frequency. This resolution is generally better than the display resolution indicated in Table 4. However, as the input frequency approaches the upper end of the 100Hz & 1000Hz ranges, the reduced internal resolution effectively approaches twice the display resolution noted in Table 4 for these ranges.

Table 4: Input Range Resolution

Input Range	Display Resolution
0 to 100.00Hz	0.01Hz
0 to 1000.0Hz	0.1Hz
0 to 50000Hz	1Hz
0 to 65535 Pulses	1 Pulse

Input Zero/Span Range Turn-Down (See Table 5): The configuration software may be used to calibrate an output response to input zero & full-scale values that are subsets of their nominal input range end points. For best results, select the smallest input range that contains the desired zero and full-scale input signals. Refer to Table 5.

Table 5: Input Zero/Full-Scale Span Selection

Nominal Input Range	Recommended Input Span Calibration Range
0 to 100.00Hz	10Hz min span within 0 to 100Hz range.
0 to 1000.0Hz	100Hz min span within 0 to 1KHz range.
0 to 50000Hz	1000Hz min span within 0-50KHz range.
0 to 65535 Pulses	1000 pulses min span recommended. All spans must include 0 as low endpoint.

Input & Alarm Accuracy: Module timing is crystal based for best accuracy, temperature stability, and minimum long term drift. For input and alarm accuracy refer to Table 6. Table 6 does not include analog output or overall accuracy (refer to Table 7). Note that the sampling mechanism used for the 100Hz and 1000Hz ranges results in decreased resolution near the upper end of the range, thus decreasing effective accuracy in this range.

Table 6: Input Measurement & Alarm Accuracy

Nominal Input Range	Accuracy at 25°C	Accuracy Over Temperature
0 to 100.00Hz	±0.02Hz (f ≤ 50Hz) ±0.04Hz (f > 50Hz)	±0.04Hz (f ≤ 50Hz) ±0.06Hz (f > 50Hz)
0 to 1000.0Hz	±0.2Hz (f ≤ 500Hz) ±0.4Hz (f > 500Hz)	±0.4Hz (f ≤ 500Hz) ±0.6Hz (f > 500Hz)
0 to 50000Hz	+/-10Hz	+/-15Hz
0 to 65535 pulses	+/-1 pulse	+/-1 pulse

Input Impedance: 35KΩ, typical.

Input Response Time/ Input Filter Bandwidth: -3dB at 35KHz, typical. See also Input Acquisition Time, Relay Response Time, and Output Update Rate for more information.

Input Acquisition Time: Frequency inputs: 100mS to 1 second (varies with input frequency). Pulse counting inputs: Input polling every 5ms (samples event at a 1.2ms rate).

Input Pullup/Pulldown: Software selectable 2.7KΩ input pullup to +5V and a 1KΩ input pulldown to return.

Input Debounce (Pulse counting inputs only): 0 (disabled) to 1 second, configurable in 5ms increments. You must select appropriately with respect to input signal bandwidth and characteristics.

Input Averaging (Frequency inputs only): Running average of 1 (disabled by default), 2,4,8, or 16 input samples, software configured. Input averaging > 1 will increase the response time.

Noise Rejection (Normal Mode): Not Applicable.

Noise Rejection (Common Mode): 80dB @ 60Hz, typical with 100Ω input unbalance.

Input Excitation Supply: +12VDC or +8.2VDC, typical at 10mA load (current limited to approximately 24mA).

Counter Reset Input: TTL or open collector/drain signal (5V logic) may be wired directly to the input terminals of the module to reset the counter value to 0. Signal is active low. Minimum reset pulse width is 5mS. Note that the counter can also be reset to zero by clicking on the "Reset Event Count" button of the IntelliPack Configuration Software.

Frequency Input Reference Test Conditions: 0 to 50KHz Bipolar 5Vpp input; Threshold 0.0V; Hysteresis +/-25mV; Input Averaging = 1; Ambient = 25°C; Power Supply = 24VDC; Output = 4-20mA, Ascending (4mA represents 0Hz; 20mA represents 50KHz). For 841T-1500 units, additionally: Relay High Limit at 50KHz; 250Hz Deadband; Automatic relay reset; Failsafe mode; Relay Time Delay of 100mS.

Pulse Counting Input Reference Test Conditions: 0 to 25K pulses; Unipolar 0 to 5V input; Threshold 1.5V; Hysteresis +/-25mV; Count positive pulses with Automatic Reset; Input Debounce = 0; Ambient = 25°C; Power Supply = 24VDC; Output = 4-20mA, Ascending (4mA represents 0 pulses; 20mA represents 25K pulses). For 841T-1500 units, additionally: Relay High Limit at 25K pulses; Automatic relay reset; Failsafe mode; Relay Time Delay of 100mS.

ANALOG OUTPUT SPECIFICATIONS

These units contain an optically isolated DAC (Digital-to-Analog Converter) that provides a process current or voltage output. Calibration can occur with respect to any output range, but only one of the outputs may operate at a time.

Note: For sensitive applications, high frequency noise may be reduced by placing a 0.1uF capacitor directly across the load.

Voltage Output Specifications:
Output Range: 0-10V DC, 0-5V DC.
Output Accuracy: See Table 7.
Output Current: 0-10mA DC maximum.
Output Impedance: 1Ω.
Output Resolution: See Table 7.
Output Short Circuit Protection: Included

Current Output Specifications:
Output Ranges: 0-20mA DC, 4-20mA DC, or 0-1mA DC.
Output Maximum Current: 21.6mA typical.
Output Accuracy: See Table 7.
Output Compliance: 10V Minimum, 12V Typical.
Output Resolution: See Table 7.
Output Load Resistance Range: 0 to 550Ω, typical.

Table 7: Analog Output Range Resolution & Accuracy

Output Range[3]	Resolution	Accuracy[1,2] at 25°C Percent-of-Span	
		Output	Overall[4]
0 to 20mA DC	0.0025%	0.025%	0.050%
4 to 20mA DC	0.0025%	0.025%	0.050%
0 to 1mA DC	0.0370%	0.100%	0.125%
0 to 10V DC	0.0025%	0.025%	0.050%
0 to 5V DC	0.0040%	0.050%	0.075%

Notes (Table 7):
1. Voltage outputs unloaded. Loading will add "I*R" error.
2. Software calibration produces high accuracy.
3. All current ranges are subsets of a 0-24mA DAC range which allows for under and over range capability. The 0-5V range is a subset of the 0-10V range.
4. For overall accuracy (input to output) add 0.025% to output accuracy, assuming full input range is utilized.

Digital-to-Analog Converter: Analog Devices AD420AR-32, 16-bit Σ-Δ. Monotonic to 16 bits.
DAC Integral Non-Linearity: ±0.002% (±1.4LSB) of span typical, 0.012% (±7.9LSB) of span maximum, utilizing full DAC output span (0-24mA).
DAC Output Temperature Drift: Better than ±20ppm/°C Typical, ±50ppm/°C Maximum.
Output Update Rate: Frequency inputs: 1 to 10 per second (varies with input frequency). Pulse counting inputs: 10 per second.
Output Settling Time: 10ms to 0.1% of full-scale, varies with load.

RELAY OUTPUT SPECIFICATIONS

Model 841T-1500 units include a SPDT electromechanical alarm relay which provides a set of high reliability, Form C (Normally Open and Normally Closed), SPDT contacts. The relay operates as a limit alarm with control of deadband/ hysteresis, latching/non-latching contacts, failsafe/non-failsafe modes, plus relay time delay.

SPDT Alarm Relay Specifications (841T-1500 Units Only):
Electrical Life - CSA Ratings:
25VDC, 5A, 10^5 operations, resistive.
48VDC, 0.8A, 10^5 operations, resistive.
240VDC, 0.1A, 10^5 operations, resistive.
120VAC, 5A, $3x10^4$ operations, resistive.
240VAC, 5A, $3x10^4$ operations, resistive.
Note: To control a higher amperage device, such as a pump, an interposing relay may be used (see Interposing Relay Connections Drawing 4501-646).
Contact Material: Silver-cadmium oxide (AgCdO).
Initial Dielectric Strength: Between open contacts: 1000VAC rms.
Expected Mechanical Life: 20 million operations. External contact protection is required for use with inductive loads (see Contact Protection Drawing 4501-646).
Relay Response: For an input step change from 10% of span on one side of an alarm point to 5% of span on the other side of the alarm point, the relay contacts will switch tracking the input acquisition time (see Input Acquisition Time specification). If configured with additional Relay Delay Time, this will add to the relay response time.

ENCLOSURE/PHYSICAL SPECIFICATIONS

See Enclosure Dimensions Drawing 4501-642. Units are packaged in a general purpose plastic enclosure that is DIN rail mountable for flexible, high density (approximately 1" wide per unit) mounting.

Dimensions: Width = 1.05 inches, Height = 4.68 inches, Depth = 4.35 inches (see Drawing 4501-642).
DIN Rail Mounting (-xx0x): DIN rail mount, Type EN50022; "T" rail (35mm).
Connectors: Removable plug-in type terminal blocks; Current/Voltage Ratings: 15A/300V; Wire Range: AWG #12-24, stranded or solid copper; Separate terminal blocks are provided for input, power, output, and relay contacts. For supply connections, use No. 14 AWG copper wires rated for at least 75°C.
Case Material: Self-extinguishing NYLON type 6.6 polyamide thermoplastic, UL94 V-2, color beige; general purpose NEMA Type 1 enclosure.
Printed Circuit Boards: Military grade FR-4 epoxy glass.
Shipping Weight: 1 pound (0.45 Kg) packed.

APPROVALS (-xxx0)

0: Agency Approvals - CE, UL Listed, and cUL Listed. UL3121 First Edition, CSA C22.2 No. 1010.1-92, Low Voltage Directive (72/23/EEC), EMC (89/336/EEC) Directives.

Product approval is limited to general safety requirements of the above standards.

Warning: This product is not approved for hazardous location applications.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature: -25°C to +70°C (-13°F to +158°F).
Storage Temperature: -40°C to +85°C (-40°F to +185°F).
Relative Humidity: 5 to 95%, non-condensing.
Power Requirements: +10V Minimum to +36V DC Maximum. Current draw is a function of supply voltage (see Table 8). Current shown in Table 8 assumes that the input excitation supply is delivering 24mA, the output circuit is at 20mA, and the IntelliPack Serial Interface Adapter is connected. For 841T-1500 units, the current shown also assumes that the alarm relay is energized. An internal diode provides reverse polarity protection.

CAUTION: Do not exceed 36VDC peak, to avoid damage to the module.

Table 8: 841T Supply Current

Supply Voltage	Model 841T-0500	Model 841T-1500 (Relay Energized)
10V	225mA	265mA
12V	180mA	205mA
15V	145mA	160mA
24V	95mA	100mA
36V	70mA	75mA

Note: Disconnecting the Serial Port Adapter will reduce current draw 7% on average, while unloading the input excitation supply will reduce current consumption about 12%.

IMPORTANT – External Fuse: If unit is powered from a supply capable of delivering more than 1A to the unit, it is recommended that this current be limited via a high surge tolerant fuse rated for a maximum current of 1A or less (for example, see Bel Fuse MJS1).

Power Supply Effect:
DC Volts: Less than ±0.001% of output span change per volt DC for rated power supply variations.
60/120 Hz Ripple: Less than 0.01% of output span per volt peak-to-peak of power supply ripple.
Isolation: Input, power, output, and optional relay output circuits are isolated from each other for common-mode voltages up to 250VAC, or 354V DC off DC power ground, on a continuous basis (will withstand 1500VAC dielectric strength test for one minute without breakdown). This complies with test requirements outlined in ANSI/ISA-82.01-1988 for the voltage rating specified.
Installation Category: Designed to operate in an Installation Category (Overvoltage Category) II environment per IEC 1010-1 (1990).
Radiated Field Immunity (RFI): Complies with IEC1000-4-3 Level 3 (10V/M, 80 to 1000MHz AM & 900MHz keyed) and European Norm EN50082-1.
Electromagnetic Interference Immunity (EMI): No relay trips will occur beyond ±0.25% of input span from setpoint and no output shifts > 0.25% of output span will occur under the influence of EMI from switching solenoids, commutator motors, and drill motors.
Electrical Fast Transient Immunity (EFT): Complies with IEC1000-4-4 Level 3 (2KV power; 1KV signal lines) and European Norm EN50082-1.
Electrostatic Discharge (ESD) Immunity: Complies with IEC1000-4-2 Level 3 (8KV/4KV air/direct discharge) to the enclosure port and European Norm EN50082-1.
Surge Immunity: Complies with IEC1000-4-5 Level 3 (2.0KV) and European Norm EN50082-1.
Radiated Emissions: Meets or exceeds European Norm EN50081-1 for class B equipment.

FIELD CONFIGURATION AND CONTROLS

In-field program capability of transmitter zero & full-scale (all models), plus alarm setpoint & dropout levels (841T-1500 only), is accomplished with module push-buttons and LED indicators (frequency input types only). This is useful for making adjustments in the absence of a host computer. **Note:** The unit must first be configured using the Configuration Software before its configuration can be changed in the field. Pulse counting input parameters cannot be changed in the field via the module push-buttons.

Module Push Buttons (See Drawing 4501-642 for Location):
Mode - Used to change mode of field configuration.
Set - Used to accept input data during field configuration.
Up - Used to increment output level during field configuration. Used to reset a latched alarm relay in operating mode.
Down - Used to decrement output level during field configuration. Used to reset a latched alarm relay in operating mode.
LED Indicators (See Drawing 4501-642 for Location):
Operating (Run) Mode
Run (Green) - Constant ON indicates power is applied and unit is operating normally. Flashing ON/OFF indicates unit is performing diagnostics (first second following power-up), or has failed diagnostics (after a few seconds).
Zero/Full-Scale (Yellow) - Turned OFF in Run mode.
Relay (Yellow) - Constant ON indicates alarm condition for relay. During field configuration, this LED has a different function (see below).
Status (Yellow) - Flashes if input frequency is unmeasurable (below 1Hz), or if input amplitude is insufficient for detection. Frequencies less than 1Hz (50KHz range) or 0.5Hz (100 & 1000Hz ranges) are interpreted as 0Hz.
Field Configuration Mode (Frequency Inputs Only)
Run (Green) - OFF in this mode.
Zero/Full-Scale (Yellow) - ON or FLASHING if zero or full-scale is being adjusted in this mode (See Table 4).
Relay (Yellow) - ON or FLASHING if alarm setpoint or dropout is being adjusted in this mode (See Table 4).
Status (Yellow) - Blinks each time "SET" is pressed to capture an I/O signal in this mode.

HOST COMPUTER COMMUNICATION

Host Computer Communication: Configuration information is downloaded from the host computer through one of its EIA232 serial ports. This port must be connected to the module through an Acromag IntelliPack Serial Port Adapter, which serves as an isolated interface converter between EIA232 and the IntelliPack SPI port (standard RJ11 6-wire phone jack).
Baud Rate (EIA232): 19.2K baud.

SOFTWARE CONFIGURATION

Units are fully reprogrammable via our user-friendly Windows 95® or NT® IntelliPack Configuration Program (Model 5030-881). A cable (5030-902) and converter (5030-913) are required to complete the interface (Software Interface Package 800C-SIP). See Drawing 4501-643.

The following transmitter and alarm attributes are selectable via the IntelliPack Configuration Software. Refer to the IntelliPack Transmitter Configuration Manual (8500-570) for a detailed explanation of these attributes and their application.

Input Configuration

Input - Range: This transmitter can be configured to accept any one of the input frequency range types described in the Input Specifications, or as an event counter, using the IntelliPack Configuration Program.

Input - Samples (For Averaging Frequency Inputs Only): Input averaging can be set to 1 (default), 2, 4, 8, or 16. The value selected indicates the number of input signal acquisitions used in computing a running average. This is useful in helping to filter out transients. Note the response time will be increased by the factor selected.

Input - Resistor (Pullup/Pulldown): Utilize the optional on-board pullup or pulldown circuits according to the input type.

Input - Threshold (Bipolar/Unipolar): Select either bipolar (zero crossing), or unipolar (non-zero crossing) input signal types. Two levels of input threshold and hysteresis are available for each input type.

Event Counter - Debounce (0-1000ms): 0 (disabled) to 1 second, configurable in 5ms increments. You must select appropriately with respect to input signal bandwidth and characteristics. Used to eliminate counting false pulses due to electro-mechanical relay contact bounce and other mechanical effects.

Event Counter - Edge (Rising/Falling): Select either the rising edge (positive), or falling edge (negative) of the input pulses to be counted.

Event Counter - Termination (Wrap, Auto-Reset, Latch): Select none (wrap), auto-reset, or latching. None will cause the counter to wrap around to zero from 65535. Auto-reset will cause the counter to be automatically reset to 0 when the value scaled to 100% is reached. Latching will cause the counter to latch at the value scaled to 100%. Any counter can be reset to zero at any time by applying an active low counter reset signal to the CRST terminal, or by clicking on the "Reset Counter" button of the IntelliPack Configuration Software.

Excitation Voltage: Use is optional. Select either +8.2V or +12V DC. Internally limited to 24mA, typical. Available at the EXC+ and EXC- terminals of the module.

Input Calibration: The configuration software can be used to calibrate the input timing of this module.

Analog Output Configuration

Output - Range: Unit can be configured for either a voltage or current output range. A jumper must also be installed between the output "I+" and "JMP" terminals for voltage output (remove this jumper for current output).
Voltage (Jumper Required): 0 to 10V DC, 0 to 5V DC
Current: 0 to 20mA DC, 4 to 20mA DC, or 0 to 1mA DC

Output - Mode: Select a normal acting (ascending), or reverse acting (descending) output response.

Output Calibration: The configuration software can be used to calibrate the output conditioning circuit of this module.

Transmitter Configuration

Scaling: Enter an input value for 0% output and an input value for 100% output (these are also field adjustable). Scaling is performed after averaging and converts the engineering units of the input range (or a portion of the input range) to 0 to 100%. That is, scaling allows virtually any part of the selected input range to be scaled to 0% and 100% at the output. For event counters, the input value for 100% output is the maximum count value.

Minimum Input Spans: 10% of the selected input frequency range. For pulse/event counting inputs, no minimum is imposed, but 1000 pulses is recommended to maintain reasonable output resolution.

Transmitter Computation Function: This model provides proportional computation only and no optional computations are provided. Each input sample is converted into a directly proportional output update.

End Points Configuration: Transmitter: Zero/Full-Scale Input maps to Zero/Full-Scale Output. Event counters always have a count of 0 as the "zero" input and the maximum count as the input for 100% output.

Alarm Configuration (Model 841T-1500)

The model 841T-1500 may be configured for simple limit alarms. You may also refer to the IntelliPack 800A alarm family for dedicated alarm modules that support other operating functions.

Limit Alarm - Input: The input signal range to the alarm is the full range for the configured input type, irregardless of the scaled range. For example, if the 0 to 100.00Hz input range was selected using the configuration program, the alarm can be programmed to any setpoint from 0 to 100Hz. If input averaging is used (samples > 1), then the averaged input value will be used by the alarm.

Limit Alarm - Mode: Select a High limit or Low limit for the limit alarm function of this model. In this mode, the relay will enter the alarm state when either the user-defined high or low setpoint is exceeded for the specified amount of time (this allows input transients to be filtered). Relay remains in the alarm state until the input signal has retreated past the defined setpoint, plus any deadband (frequency inputs only), for the specified amount of time. A high limit is assumed for the event counter input.

Limit Alarm - Setpoint: A high or low setpoint may be assigned to the relay and is programmable over the entire input range (this is also field adjustable). The relay will trip on an increasing input signal for a high setpoint, and on a decreasing input signal for a low setpoint. A high setpoint is assumed for the event counter input.

Limit Alarm - Deadband (Frequency Inputs Only): Deadband is associated with the setpoint and is programmable over the entire input range (this is also field adjustable). Deadband determines the amount the input signal has to return into the "normal" operating range before the relay contacts will transfer out of the "alarm" state. Deadband is normally used to eliminate false trips or alarm "chatter" caused by fluctuations in the input near the alarm point. Note that deadband may also apply to latched alarms. If the alarm is latching, it is recommended that the deadband be set to a minimum. Deadband has no application to the event counter input.

> **IMPORTANT:** Noise and/or jitter on the input signal has the effect of reducing (narrowing) the instrument's deadband and may produce contact chatter. Another long term effect of contact chatter is a reduction in the life of the mechanical relay contacts. To reduce this undesired effect, increase the deadband setting.

Alarm Indicator: A yellow LED (labeled "RLY") for the relay provides visual status indication of when the relay is in alarm (LED is ON in alarm). This LED is also used in field configuration mode to indicate whether setpoint or deadband is being adjusted.

Relay - Time Delay (0-4000ms): Programmable from 0 milliseconds to 4 seconds in 100ms increments for this model (typically used to help filter input transients and avoid nuisance alarming). A minimum delay of 100ms is recommended for increased noise immunity and conformance to applicable safety standards. This delay does not apply to control of the transmitter's analog output.

Relay - Operating Mode (Failsafe/Non-Failsafe): User configurable for "failsafe" operation (relay deenergized in alarm state), or non-failsafe operation (relay energized in alarm state). Failsafe mode provides the same contact closure for alarm states as for power loss, while non-failsafe mode uses alarm contact closure opposite to power loss conditions.

Relay - Reset (Automatic/Latching): The relay may be configured to automatically reset when the input retreats past its setpoint and deadband, or the relay may latch into its alarm state. A push-button reset switch is located on the front of the module (use the up or down arrow buttons) and is used to exit the latched state (this may also be accomplished under software control).

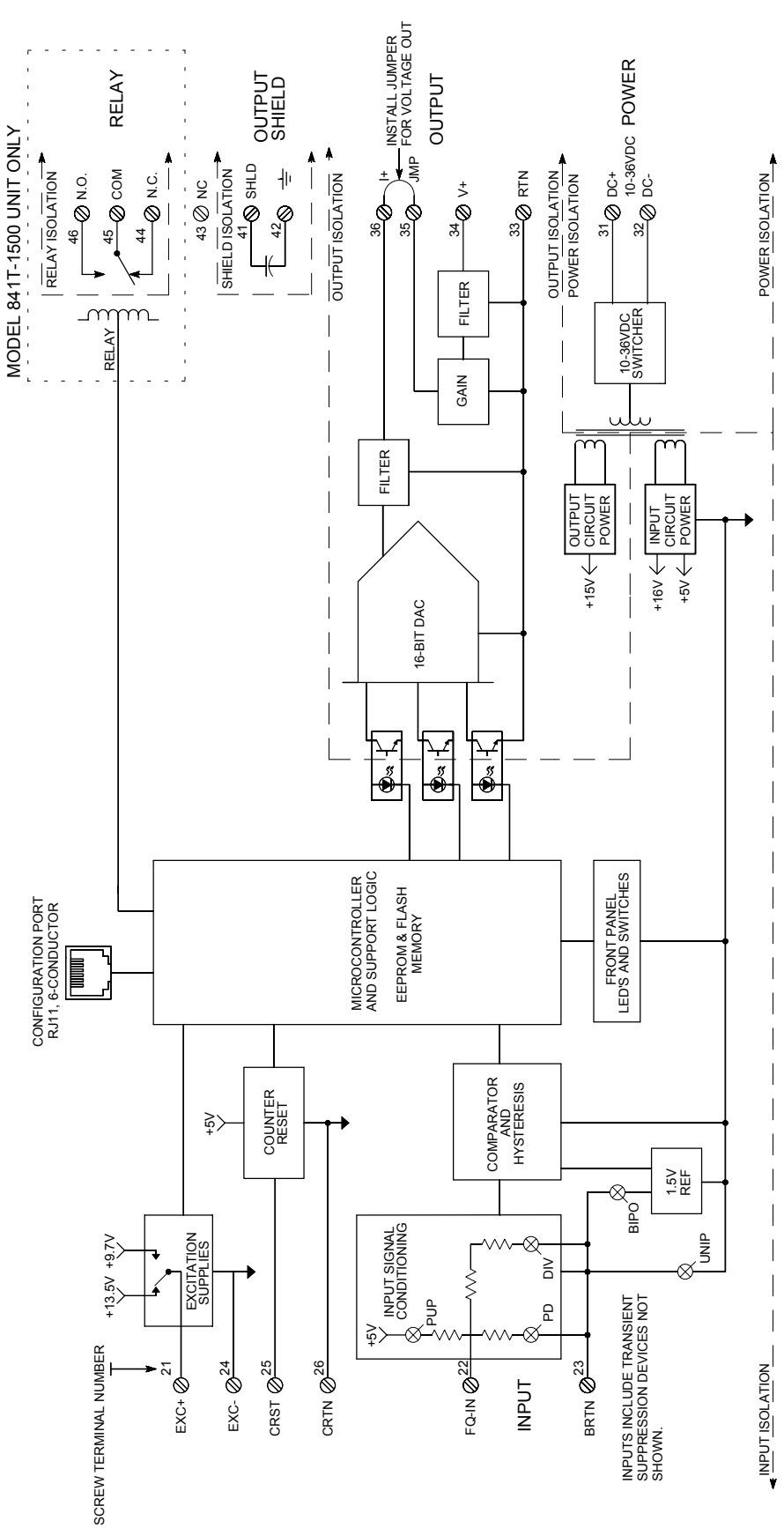
Other IntelliPack Configuration Software Capabilities

In addition to configuring all features of the module described above, the IntelliPack Configuration Software includes additional capabilities for testing and control of the module as follows:

- Monitors the input and output signal values and allows polling to be turned on or off.
- Allows a configuration to be uploaded or downloaded to/from the module. Also provides a means to rewrite a module's firmware if the microcontroller is replaced or a module's functionality is updated.
- Provides controls to separately calibrate the input and output stages and restore the original factory input or output calibration in case of error.
- Provides controls to reset a module and reset a latched alarm.
- Provides a control to reset the event/pulse counter to zero.
- Provides a control to adjust a transmitter's output signal independent of the input signal.
- Allows optional user documentation to be written to the module. Documentation fields are provided for tag number, comment, configured by, location, and identification information. This information can also be uploaded from the module and printed.
- Allows a module's configuration to be printed on an easy to read two page form, including user documentation.

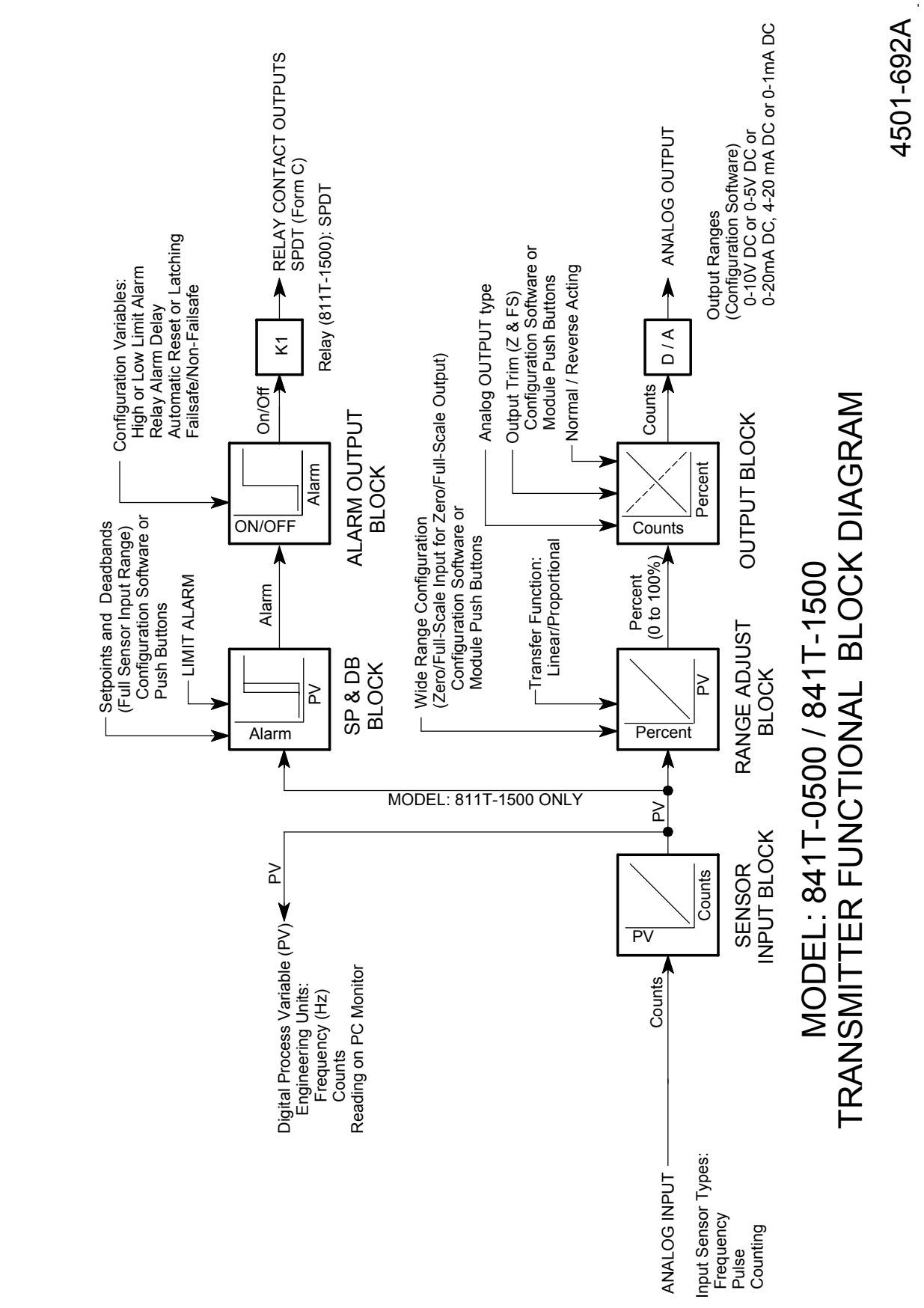
For complete information on the IntelliPack Configuration Software, refer to Transmitter Configuration Manual 8500-570.

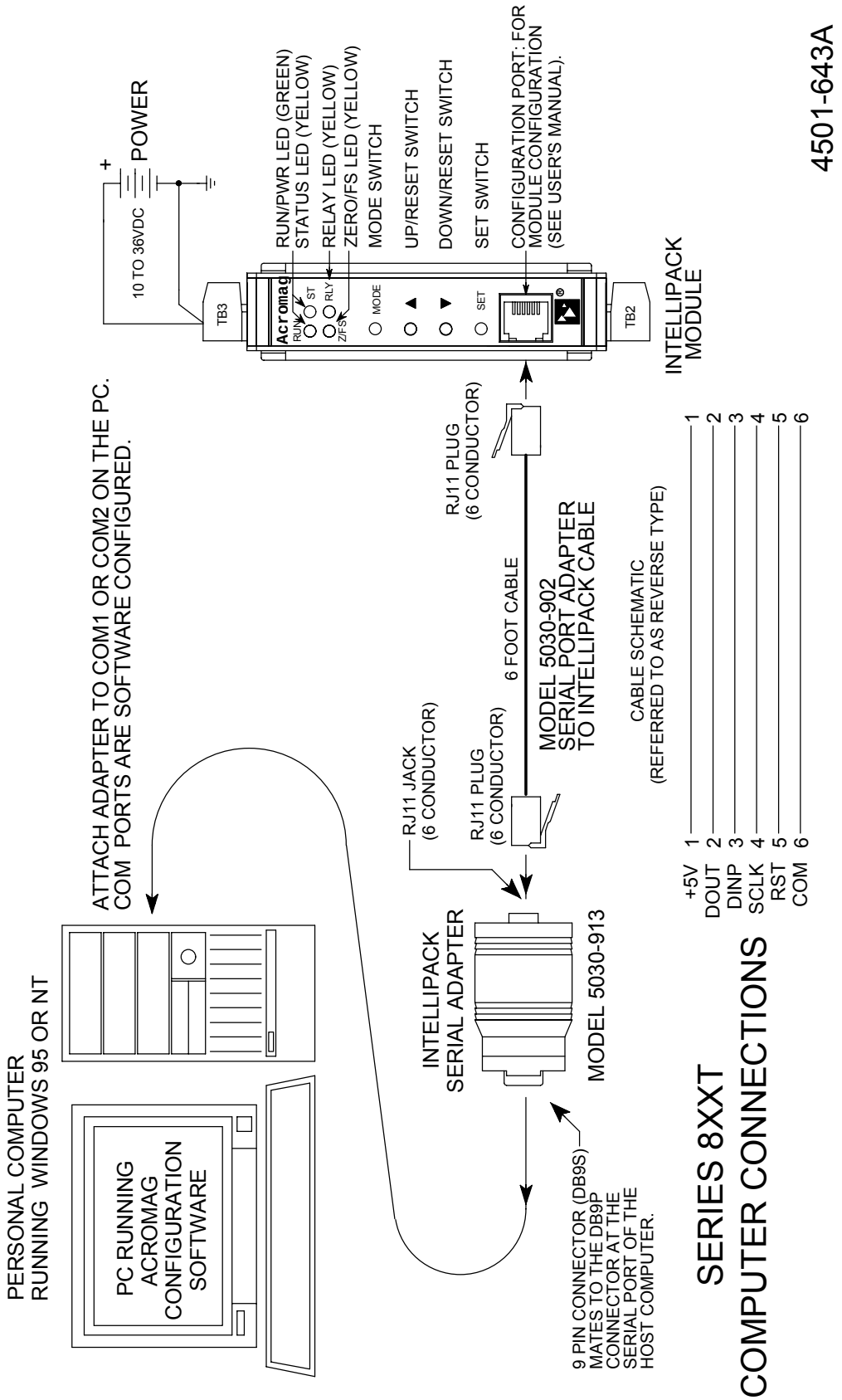
Notes:



SERIES 841T SIMPLIFIED SCHEMATIC

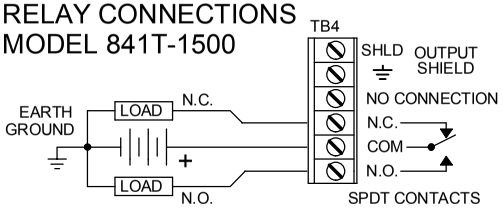
4501-682B


MODEL: 841T-0500 / 841T-1500
TRANSMITTER FUNCTIONAL BLOCK DIAGRAM
4501-692A
ANALOG INPUT
Input Sensor Types:
Frequency
Pulse
Counting
SENSOR
INPUT BLOCK
RANGE ADJUST
BLOCK
OUTPUT BLOCK
SP & DB
BLOCK
ALARM OUTPUT
BLOCK
MODEL: 811T-1500 ONLY
Digital Process Variable (PV)
Engineering Units:
Frequency (Hz)
Counts
Reading on PC Monitor
Setpoints and Deadbands
(Full Sensor Input Range)
Configuration Software or
Push Buttons
LIMIT ALARM
Configuration Variables:
High or Low Limit Alarm
Relay Alarm Delay
Automatic Reset or Latching
Failsafe/Non-Failsafe
Wide Range Configuration
(Zero/Full-Scale Input for Zero/Full-Scale Output)
Configuration Software or
Module Push Buttons
Transfer Function:
Linear/Proportional
Analog OUTPUT type
Output Trim (Z & FS)
Configuration Software or
Module Push Buttons
Normal / Reverse Acting
Output Ranges
(Configuration Software)
0-10V DC or 0-5V DC or
0-20mA DC, 4-20 mA DC or 0-1mA DC
RELAY CONTACT OUTPUTS
SPDT (Form C)
Relay (811T-1500): SPDT
ANALOG OUTPUT
PV
Counts
Percent
Alarm
ON/OFF
K1
D / A
On/Off
Percent
(0 to 100%)

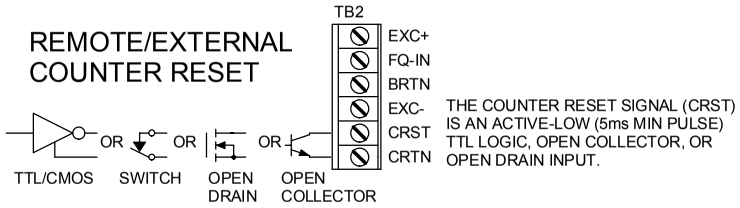

SERIES 8XXT
COMPUTER CONNECTIONS
4501-643A
PERSONAL COMPUTER
RUNNING WINDOWS 95 OR NT
PC RUNNING
ACROMAG
CONFIGURATION
SOFTWARE
ATTACH ADAPTER TO COM1 OR COM2 ON THE PC.
COM PORTS ARE SOFTWARE CONFIGURED.
INTELLIPACK
SERIAL ADAPTER
MODEL 5030-913
9 PIN CONNECTOR (DB9S)
MATES TO THE DB9P
CONNECTOR AT THE
SERIAL PORT OF THE
HOST COMPUTER.
RJ11 JACK
(6 CONDUCTOR)
RJ11 PLUG
(6 CONDUCTOR)
6 FOOT CABLE
MODEL 5030-902
SERIAL PORT ADAPTER
TO INTELLIPACK CABLE
RJ11 PLUG
(6 CONDUCTOR)
CABLE SCHEMATIC
(REFERRED TO AS REVERSE TYPE)
+5V 1
DOUT 2
DINP 3
SCLK 4
RST 5
COM 6
INTELLIPACK
MODULE
TB3
TB2
10 TO 36VDC
POWER
RUN/PWR LED (GREEN)
STATUS LED (YELLOW)
RELAY LED (YELLOW)
ZERO/FS LED (YELLOW)
MODE SWITCH
UP/RESET SWITCH
DOWN/RESET SWITCH
SET SWITCH
CONFIGURATION PORT: FOR
MODULE CONFIGURATION
(SEE USER'S MANUAL).

ELECTRICAL CONNECTIONS
MODEL 841T-1500
MODEL 841T-0500

RELAY CONNECTIONS
MODEL 841T-1500



REMOTE/EXTERNAL COUNTER RESET

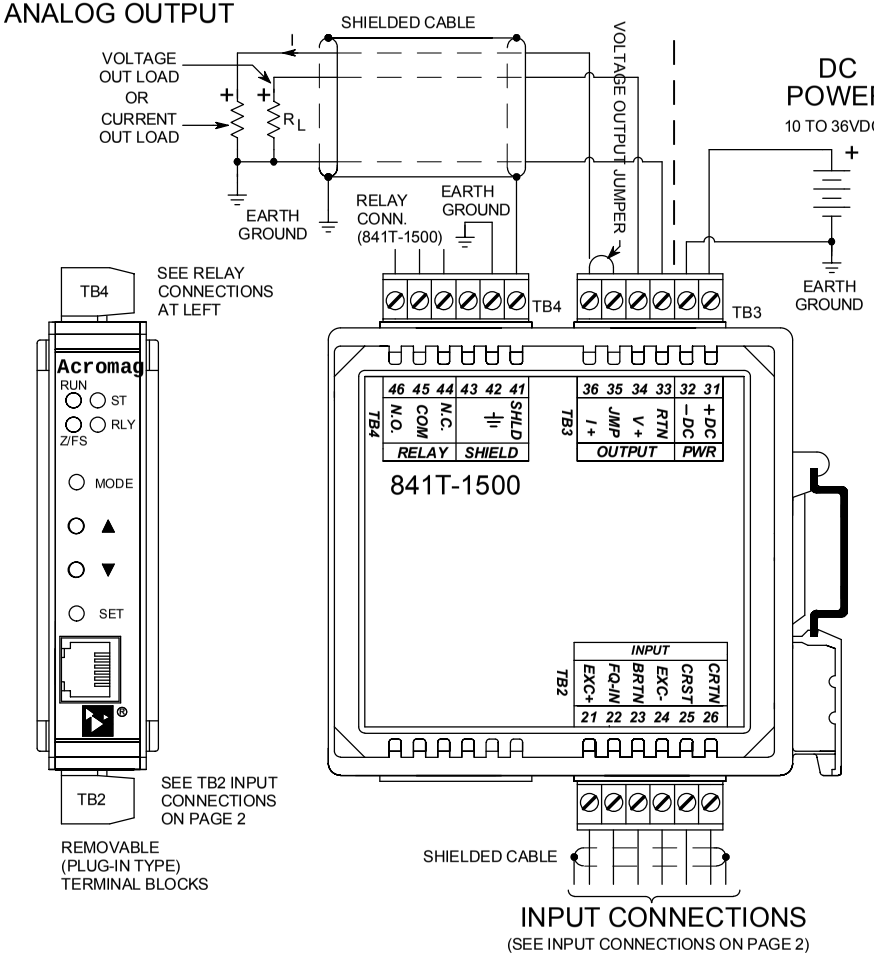


THE COUNTER RESET SIGNAL (CRST) IS AN ACTIVE-LOW (5ms MIN PULSE) TTL LOGIC, OPEN COLLECTOR, OR OPEN DRAIN INPUT.

WARNING:
FOR COMPLIANCE TO APPLICABLE SAFETY AND PERFORMANCE STANDARDS, THE USE OF SHIELDED CABLE IS RECOMMENDED AS SHOWN. ADDITIONALLY, THE APPLICATION OF EARTH GROUND MUST BE IN PLACE AS SHOWN IN THIS DRAWING. FAILURE TO ADHERE TO SOUND WIRING AND GROUNDING PRACTICES MAY COMPROMISE SAFETY AND PERFORMANCE.

SAFETY GUIDELINES MAY REQUIRE THAT THIS DEVICE BE HOUSED IN AN APPROVED METAL ENCLOSURE OR SUB-SYSTEM, PARTICULARLY FOR APPLICATIONS WITH VOLTAGES GREATER THAN OR EQUAL TO 75VDC/50VAC.

ANALOG OUTPUT



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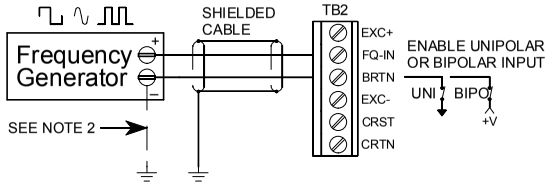
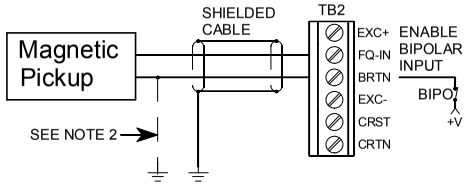
PG 1 OF 2

MODEL 841T EXAMPLE INPUT CONNECTIONS AT TB2

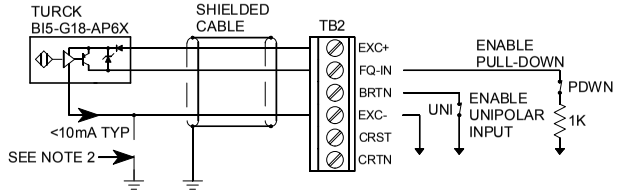
FREQUENCY INPUT



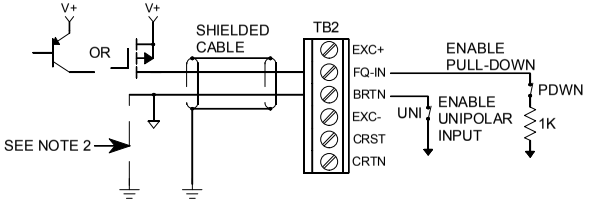
MAGNETIC PICKUP



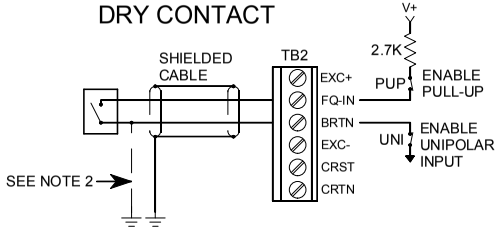
SOURCING PROXIMITY SENSOR (3-Wire, Open Collector or Drain)



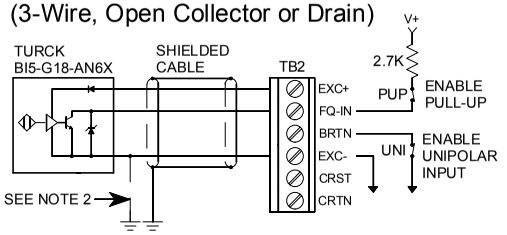
HIGH-SIDE SWITCH (Open Collector/Drain)



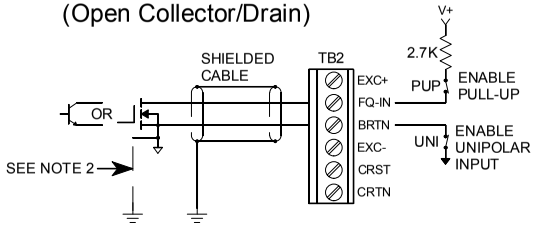
DRY CONTACT



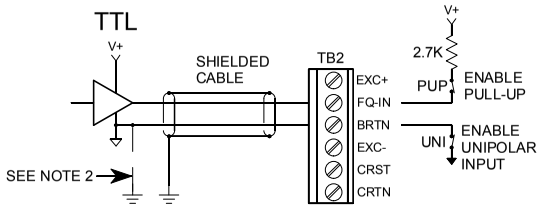
SINKING PROXIMITY SENSOR (3-Wire, Open Collector or Drain)



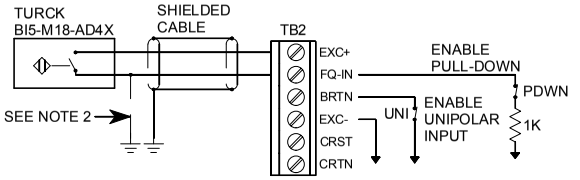
LOW-SIDE SWITCH (Open Collector/Drain)



TTL



SOURCING PROXIMITY SENSOR (2-Wire)



NOTE 2: THIS GROUND CONNECTION IS RECOMMENDED FOR BEST RESULTS. IF SENSORS ARE INHERENTLY CONNECTED TO GROUND, USE CAUTION AND AVOID MAKING ADDITIONAL GROUND CONNECTIONS WHICH COULD GENERATE GROUND LOOPS AND MEASUREMENT ERROR.

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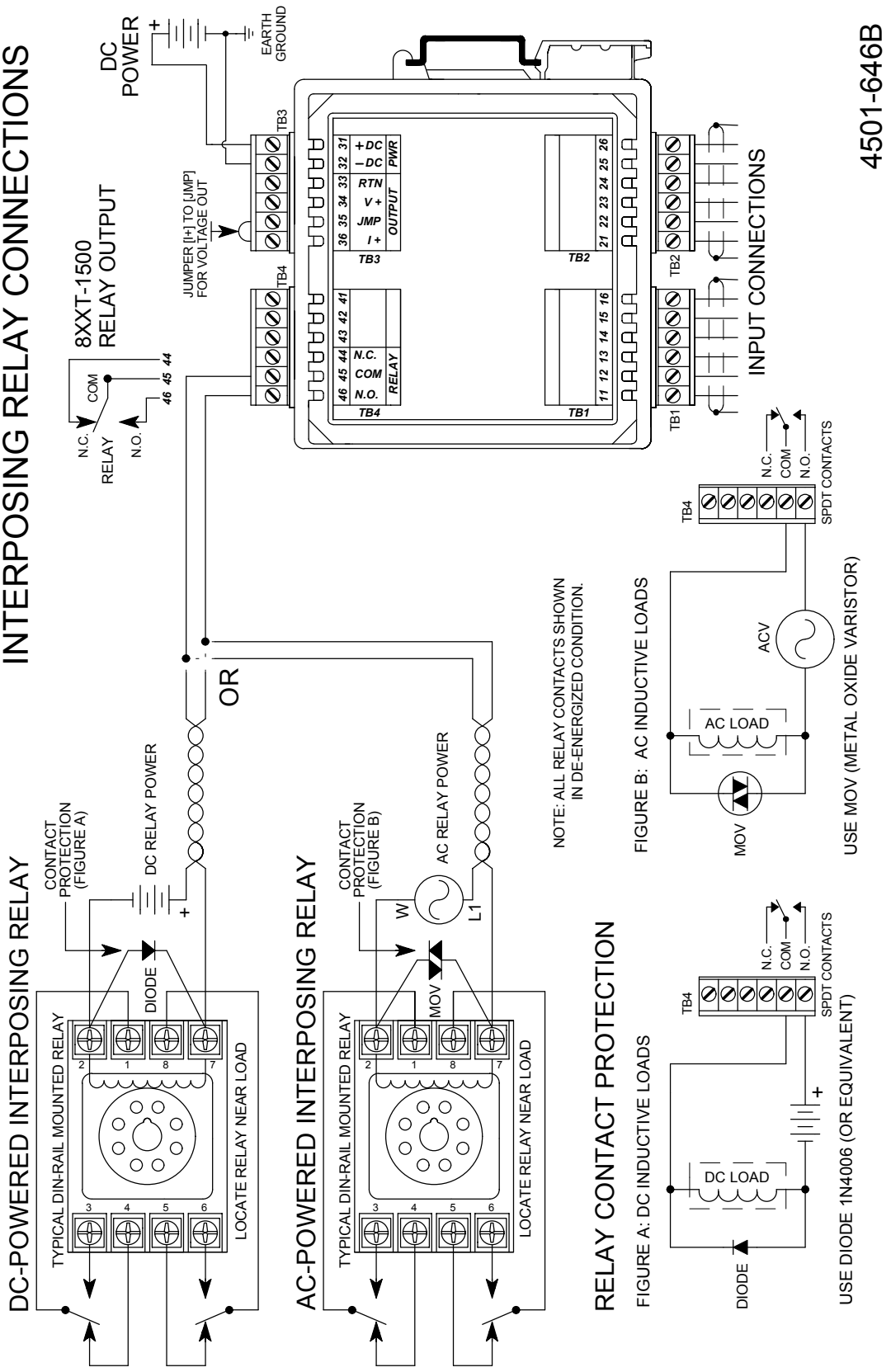
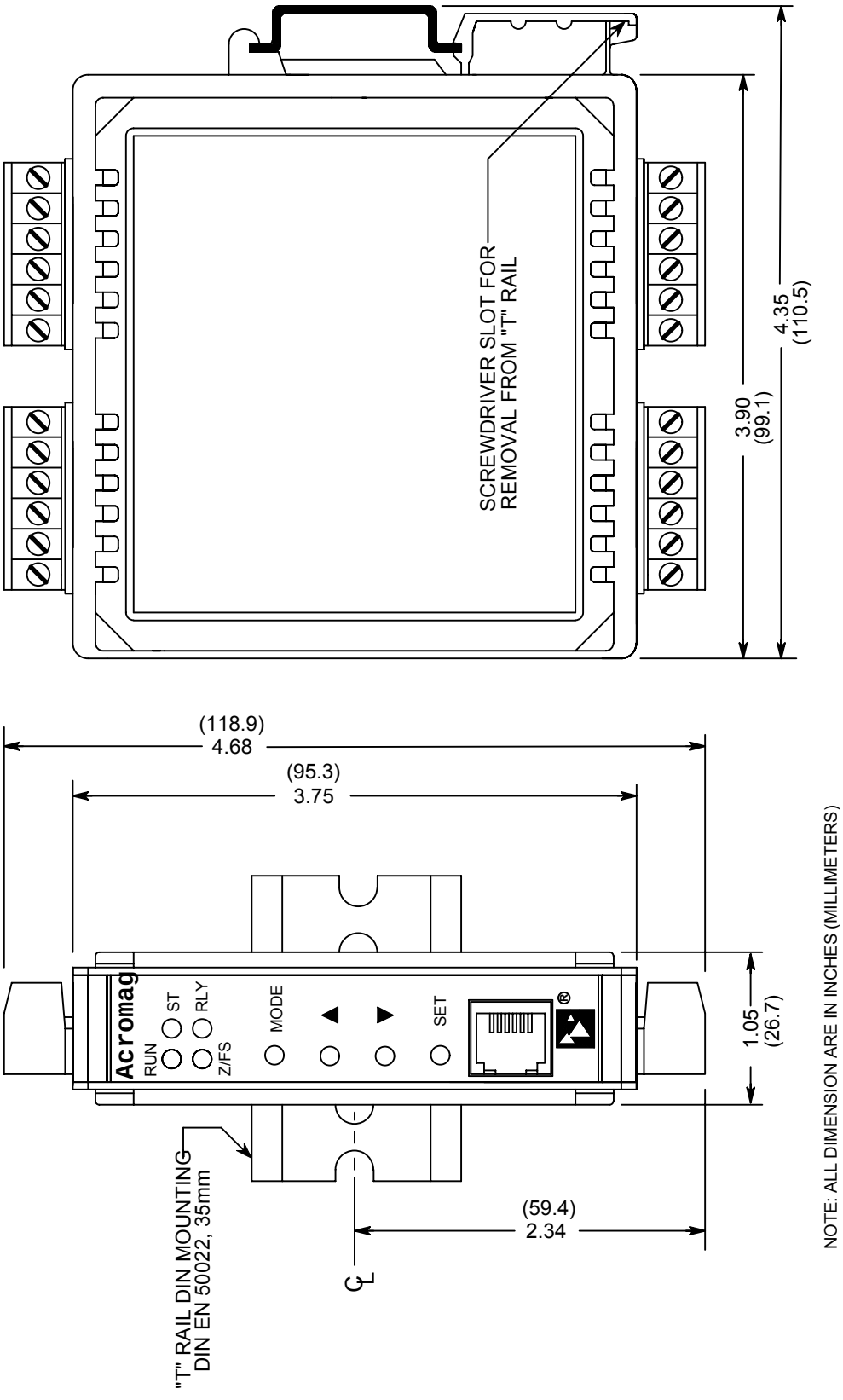
PG 2 OF 2


INTERPOSING RELAY CONNECTIONS
DC POWER
EARTH GROUND
8XXT-1500 RELAY OUTPUT
JUMPER [I+] TO [JMP] FOR VOLTAGE OUT
TB3
TB4
TB2
TB1
+DC
–DC
RTN
V+
JMP
I+
OUTPUT
PWR
N.C.
COM
N.O.
RELAY
INPUT CONNECTIONS
4501-646B
OR
DC-POWERED INTERPOSING RELAY
CONTACT PROTECTION (FIGURE A)
DC RELAY POWER
DIODE
TYPICAL DIN-RAIL MOUNTED RELAY
LOCATE RELAY NEAR LOAD
AC-POWERED INTERPOSING RELAY
CONTACT PROTECTION (FIGURE B)
AC RELAY POWER
MOV
W
L1
NOTE: ALL RELAY CONTACTS SHOWN IN DE-ENERGIZED CONDITION.
FIGURE B: AC INDUCTIVE LOADS
ACV
AC LOAD
MOV
SPDT CONTACTS
USE MOV (METAL OXIDE VARISTOR)
RELAY CONTACT PROTECTION
FIGURE A: DC INDUCTIVE LOADS
DC LOAD
DIODE
SPDT CONTACTS
USE DIODE 1N4006 (OR EQUIVALENT)


4501-642A
INTELLIPACK TRANSMITTER
ENCLOSURE DIMENSIONS
SCREWDRIVER SLOT FOR
REMOVAL FROM "T" RAIL
4.35
(110.5)
3.90
(99.1)
(118.9)
4.68
(95.3)
3.75
Acromag
RUN
ST
RLY
Z/FS
MODE
SET
1.05
(26.7)
"T" RAIL DIN MOUNTING
DIN EN 50022, 35mm
(59.4)
2.34
NOTE: ALL DIMENSION ARE IN INCHES (MILLIMETERS)